

## RESPONSE TO LETTER

**Physiology and evolution at the crossroads of plasticity and inheritance**Arnaud Pocheville<sup>1</sup>  
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In Danchin & Pocheville (2014), we urged that physiology and evolution be better integrated, as it is more and more apparent that they represent two facets of a single biological process. The first reason for this integration is somehow classical but still essential. Physiology is central in determining the selective value of organisms, and thus the evolutionary dynamics. Physiology itself can evolve,

for instance towards local physiological optima. In providing a physical model to explain the inverse relationship between heart rate and body size in mammals, Lin Wang & Wang (2015) exemplify such an integration of physiology and evolution. The second reason to better integrate these two processes is that physiology is now more and more widely recognized as a direct cause of hereditary variation. For evolutionary theory, such an impact of physiology is a striking novelty. Indeed, hereditary variation serves as a fuel for natural selection and has usually been assumed to be 'blind' to the physiology of organisms, a hypothesis often framed in terms of 'random' mutation (Pocheville & Danchin, in press). Epigenetic mechanisms seem to have a central role in linking physiology and evolution, as they are at the same time mechanisms of plasticity and non-genetic inheritance, and mechanisms which favour genetic

mutation. The momentum recently gained by the study of epigenetic mechanisms brings physiology back at the heart of evolution.

**References**

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**Additional information****Competing interests**

None declared.